

## First/Second Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan.2024 Applied Chemistry for Civil Engineering Stream

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. VTU Formula Hand Book is permitted.  
3. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	What is Glass? Describe the preparation of Soda Lime Glass.	07	L2	CO1
	b.	Explain the various steps involved in the manufacture of cement by wet process with a flow chart.	06	L2	CO1
	c.	Define Refractories. Write the properties and applications of refractory materials.	07	L3	CO1
OR					
Q.2	a.	What is Cement? Illustrate the process of setting and hardening of cement with chemical reactions.	07	L3	CO1
	b.	Define alloys. Write the properties and applications of Iron and its alloys.	07	L3	CO1
	c.	Write a note on additives used in the manufacture of cement.	06	L3	CO1
Module – 2					
Q.3	a.	Illustrate the construction and working of Methanol – Oxygen fuel cell.	06	L4	CO2
	b.	Define corrosion. Describe the electrochemical corrosion of steel in concrete.	07	L2	CO2
	c.	What is anodizing? Explain anodizing of aluminium. Mention its applications.	07	L2	CO2
OR					
Q.4	a.	Define PV cell. Illustrate the construction and working of Photovoltaic Cell.	07	L3	CO2
	b.	Explain differential metal and aeration corrosion with suitable examples.	07	L2	CO2
	c.	Explain how material selection and design can prevent corrosion.	06	L2	CO2
Module – 3					
Q.5	a.	100 ml of a water sample required 20ml of 0.01 M EDTA for the titration with Erichrome Black-T indicator, 100 ml of the same water sample after boiling and filtering required 10 ml of 0.01 M EDTA. Calculate (i) Total hardness (ii) Permanent Hardness (iii) Temporary Hardness of the sample.	07	L3	CO3
	b.	With a neat labeled diagram illustrate the softening of hard water by ion exchange method.	07	L3	CO3
	c.	Explain the following size dependent properties of nanomaterials: (i) Catalytic property (ii) Surface area	06	L2	CO3
OR					
Q.6	a.	What is desalination? Explain desalination of brackish water by forward osmosis.	07	L2	CO3
	b.	Define Nanomaterials. Demonstrate the synthesis of Nanomaterials by Sol-gel method.	07	L3	CO3
	c.	Write a note on use of metal-oxide nano particles in the treatment of water.	06	L3	CO3

Module – 4					
Q.7	a.	Calculate the number average molecular mass ( $M_n$ ) and weight average molecular mass ( $M_w$ ) of a polymer in which 30% molecules have a molecular mass 20,000 ; 40% have 30,000 and the rest have 60,000.	06	L3	CO4
	b.	Define Fibers. Explain the synthesis, properties and applications of Nylon Fibers.	07	L2	CO4
	c.	Define Polymer Composites. Write the properties and applications of Fiber Reinforced Polymer (FRP) and Geo-Polymer Concrete (GPC).	07	L3	CO4
OR					
Q.8	a.	Explain the synthesis, properties and applications of Chloropolyvinyl chloride.	06	L2	CO4
	b.	Define Biodegradable Polymer. Explain the steps involved in the preparation of polylactic acid and mention the applications.	07	L2	CO4
	c.	What are adhesives? Explain the synthesis, properties and applications of epoxy resin.	07	L2	CO4
Module – 5					
Q.9	a.	State Phase Rule. Explain the terms involved in the phase rule with examples.	07	L2	CO5
	b.	With the help of a neat phase diagram, explain the Lead-Silver system.	07	L2	CO5
	c.	Describe the determination of pH of soil sample using pH sensors.	06	L2	CO5
OR					
Q.10	a.	State and explain phase rule for two component system. Mention the use of phase diagram.	06	L2	CO5
	b.	Illustrate the principle and instrumentation of conductometric sensors.	07	L2	CO5
	c.	Explain the applications of potentiometric sensors in the estimation of iron.	07	L2	CO5

\*\*\*\*\*